



Singapore
Accreditation
Council

ACCREDITATION SCHEME FOR LABORATORIES

IT 002

**General Requirements for
Information Technology
Laboratories for Gaming Testing**

1 Introduction

- 1.1 The field of Gaming Testing and this Technical Note covers a diverse range of software and hardware testing of gaming equipment, where the scope of testing as well as reporting requirements will be dictated by the specific regulatory requirements stipulated in the jurisdiction(s) for which the testing laboratory wishes to conduct testing for.
- 1.2 This Technical Note should be read in conjunction with documents SAC 01 "Terms and Conditions for Accreditation" and ISO/IEC 17025 "General requirements for the competence of testing and calibration laboratories".
- 1.3 The information contained in this Technical Note constitutes either amplifications or clarifications to requirements of ISO/IEC 17025 in relation to testing of gaming equipment. Key clauses unique to gaming testing laboratories are highlighted within this document.

2 References

- 2.1 ISO/IEC 17000: Conformity assessment – Vocabulary and General Principles
- 2.2 ISO/IEC 17025: General requirement for the competence of testing and calibration laboratories
- 2.3 IEEE STD 610-12: IEEE Standard Glossary of Software Engineering Terminology

3 Definitions

- 3.1 **Acceptance Testing:** Formal testing conducted to determine whether or not a system satisfies acceptance criteria and to enable the customer to determine whether to accept the system [IEEE STD 610-12].
- 3.2 **ASP (Application Service Provider):** Hosted software contractor. An ASP operates software at its data center, which customer's access online under a service contract. Specifically for testing this would apply to ASP services important to testing, supplied to the laboratory.
- 3.3 **Configuration Management:** A discipline applying technical and administrative direction and surveillance to identify and document the functional and physical characteristics of a configuration item, control changes to those characteristics, record and report change processing and implementation status and verify compliance with specified requirements. [IEEE STD 610-12]
- 3.4 **COTS (Commercial-Off-The Shelf) Software:** Code that is purchased without modification and either cannot or will not be modified by the lab. An example of this would be Microsoft Word/Excel/or dedicated instrument interface.

- 3.5 **Criticality or Severity:** The degree of impact that a requirement, module, fault, error, failure, or other item has on the development or operation of a system. [IEEE STD 610-12]
- 3.6 **Error or Fault:** The difference between a computed, observed, or measured valued or condition and the true, specified, or theoretically correct value or condition. [IEEE STD 610-12]
- 3.7 **MOTS (Modified-Off-The Shelf) Software:** COTS software that is configured or adapted to a specific application. Examples include Lab Windows, Lab Tech Notebook, Tile EMC, generic data acquisition software, excel formulas, or MS Office macros, etc.
- 3.8 **Product:** Any COTS, MOTS, or custom software is considered a product.
- 3.9 **Software Life Cycle (SLC):** The period of time that begins when a software product is conceived and ends when the software is no longer available for use. [IEEE STD 610-12]
- 3.10 **SUT (System Under Test):** The software product or system undergoing testing by the laboratory
- 3.11 **System:** A computing environment that contains both hardware and software. A collection of components organized to accomplish a specific function or set of functions [IEEE STD 610-12]
- 3.12 **Test Cases:** A set of test inputs, execution conditions, and expected results developed for a particular objective, such as to exercise a particular program path or to verify compliance with a specific requirement [IEEE STD 610-12]
- 3.13 **Test Environment:** An operating environment that emulates, as close as possible, the target environment of the SUT. The test environment includes hardware, operating system, and any other software products running on the same machine.
- 3.14 **Test Plan:** A document that describes the technical and management approach to be followed for testing a system or component [IEEE STD 610-12]
- 3.15 **Test Specification:** A document that specifies the test inputs, execution conditions, and predicts results for an item to be tested. [IEEE STD 610-12]
- 3.16 **Test Suite:** A collection of test cases to be executed as a logical group.
- 3.17 **Test Tools:** Software or hardware products that are used to facilitate the testing of the SUT.

4 Personnel

The key personnel and nominees for approved signatories shall be competent to make a critical evaluation of test results and be a staff occupying a position in the organisation structure which is responsible for the adequacy of results. They should have at least 3 years of experience in the area of gaming testing and a degree in any of the following disciplines:

- a) Computer Science / Programming
- b) Mathematics /Statistics
- c) Electrical / Electronic Engineering

5 Facilities and Environmental Conditions

For Gaming Testing, the term “environment” includes the hardware and associated software on which the software being tested is running. The laboratory shall ensure that any interference from the other activities in the system does not invalidate the results of the specified tests.

6 Equipment

- 6.1 Software test tools significant to testing are considered equipment and shall follow the appropriate ISO/IEC 17025 section 6.4 clauses.
- 6.2 Software Tool validation confirms that the software tool meet the specified requirements. The software tools shall be validated and documented, wherever it would affect the test result or repeatability of testing. The documentation shall include the following objective evidence:
 - a) Customised software testing tools - Full validation effort
 - b) COTS software tools (used as it is) - Acceptance testing for each installed instance
 - c) MOTS software tools - Acceptance testing for each installed instance along with validation of the modification or tailoring
- 6.3 Each software test tool installation (instance) shall undergo a documented installation/operational qualification prior to use. There shall be documented evidence of the configuration and inventory of each specific installed software or system and suitable tests to confirm functionality, wherever it would affect the test result or repeatability of testing.
- 6.4 Software test tools can be installed on many systems. Each instance of test tool software shall be uniquely identified on each target environment and be under configuration management.

- 6.5 Software test tools should be reset or logs emptied between test candidates to ensure that only current test data is recorded, wherever it would affect the test result or repeatability of testing.
- 6.6 Automated test cases should be checked for validity between test candidates to ensure valid test results.
- 6.7 Software test tool configurations shall be safeguarded appropriately.

7 Validation of Methods

- 7.1 Discussion of *test methods* as defined in ISO/IEC 17025 section 7.2 are referred to as *testing methodology(s)*.
- 7.2 The laboratory shall define and document a testing methodology which shall address at least the following:
 - a) Test preparation and setup
 - b) Test coverage and traceability to requirement
 - c) Assurance that test case results are not ambiguous and have single thread of execution with objective results relating to expected outcomes
 - d) Test document approval prior to testing
 - e) Completed test case review and approval
 - f) Test reporting with anomaly severity classifications
 - g) Test candidate configuration management

It may also include the following, subject to contract review:

- h) Test anomaly characterisation and priority
 - i) Criteria for running partial testing or re-testing candidates
 - j) Any other topics with agreement with the customer
- 7.3 Testing work shall be defined in Test Plans, Test Specifications, Test Cases, or other test suite deliverables as defined in the testing methodology. These can also be encompassed in an overall Validation Plan with matching Validation Report as defined by the methodology.
- 7.4 The test suites/plans/specifications/cases shall be technically reviewed and approved prior to execution. This can be considered the validation of test method as defined in ISO/IEC 17025:2017 – 7.2.2. This review shall include:
 - (a) Confirmation of adequate test coverage of all requirements
 - (b) Confirmation that test case results are not ambiguous and have objective pass/fail criteria

- (c) Confirmation that any automated test suites will produce valid results

8 Evaluation of Measurement Uncertainty

The concept of Measurement Uncertainty (MU) typically is not applicable as gaming testing executes digital logic on a pass/fail basis. MU may be applied to gaming testing when the SUT is performing mathematical operations or using approximations and rounding in statistical analysis, calculus, or geometry, an uncertainty may be introduced by the algorithms themselves. Where this becomes significant to the output or functioning of the SUT, MU shall be documented.

9 Handling of tests and calibration items

- 9.1 Laboratories shall maintain software test candidates (SUT samples) under configuration management with appropriate metadata to ensure it is unique.
- 9.2 SUTs maintained under a common configuration management system accessible by customers shall be controlled and isolated.

10 Technical Records

Apart from the actual testing records and the corresponding raw data, the laboratory shall ensure that sufficient records of the following nature are kept for the purpose of restructuring the testing environment:

- a) Hardware Specifications
 - Details such as hardware components used and their respective specifications such as processor speed, memory specifications if they affect the test result or repeatability of testing
- b) Software Specifications
 - Details shall minimally include the operating system, compilers and emulators with the exact versions
- c) Testing Environment
 - Any other pertinent details of the testing environment including physical environment conditions, if they affect the test result or repeatability of testing.